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ABSTRACT

This report (1) describes a Nebraska school district's implementation of a central data processing capability and (2) summarizes study findings researched in cooperation with International Business Machines (IBM). In the mid-seventies, the district hired data processing personnel and introduced microcomputers into buildings; lack of standardization resulted in chaotic planning. An assistant to the superintendent for technology, hired in 1984, adopted IBM's cost-effective planning process that assists educational institutions--the Applications Transfer System (ATS). To take advantage of IBM's gratis provision of specialists, an administrator workshop reached consensus on goals for the ATS study. Goals identified methods for communication, training, and policy development. Subsequent steps included team orientation, development of questionnaires, sample selection, and target dates. Questions elicited staff problems and recommendations. Data findings are presented in tables, which include specified areas associated with improved data processing. The final plan for technological implementation entailed multiterminal minicomputer systems for each school, linked through the mainframe. The board of education approved the plan and established a nonprofit corporation for funding. Followup evaluations revealed support for the study's importance and the plan's provisions. This report concludes that establishing direction and eliciting support are the unwritten reasons for the study's accomplishments. (CJH)

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A PROCEDURE FOR IDENTIFYING AND MEETING THE INFORMATION AND COMMUNICATION NEEDS IN A PUBLIC SCHOOL

Educational Service Unit No. 18
Lincoln, Nebraska

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A PROCEDURE FOR IDENTIFYING AND MEETING THE INFORMATION AND COMMUNICATION NEEDS IN A PUBLIC SCHOOL

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Like many other school districts around the nation, the Lincoln (NE) Public Schools experienced its' share of frustration as it entered the information age. The history of data processing within the district has been checkered with indecision, false starts, and unfulfilled expectations. For many years the data processing department was headed by a former math teacher that had no formal training in data processing. The programming staff was very small and was also involved in operations. Administration of data processing was considered an extra-duty assignment. The primary focus of the department was central office record keeping.

During the mid-seventies a concerted effort was made to provide support to the Instructional Division and to building principals. The effort involved the purchase of considerable computer hardware including hardcopy terminals, which were placed in the buildings, and two main frame computers. The two computers were purchased from different vendors and the primary programming languages used in the two machines differed. This duality split the programming staff in two groups, one writing applications in Basic and one writing applications in Cobol. The district was never able to resolve communications problems between the two machines. Instructional systems were designed but never fully implemented, or if implemented, not maintained. Consequently the applications needed to effectively use the terminals in the buildings were not available. The confusion that resulted led to personnel changes within the department, including two changes in the directors

position, and the transfer of responsibility for data processing from the Associate Superintendent for Business Affairs to the Superintendent of Schools.

From the mid to late seventies through the early eighties, the district made significant progress in the development of a central data processing capability. A director of data processing with considerable experience in main frame computers was hired. The central computer was upgraded substantially. Fourth generation software was introduced and eventually replaced Cobol. Additional programming tools were also added to increase productivity. The district evaluation team became more involved in data processing and became a second outlet for applications.

During this period of progress in central computing cabilities, microcomputers were introduced into the district, primarily in the buildings. By 1981 the district situation regarding administrative microcomputers could best be described as chaotic. The district had no procurement plan and no standardized specifications. Each building was marching to its' own drummer.

In 1982, as the first step in coordinating the use of microcomputers, the district hired a computer consultant. The consultant was primarily responsible for the instructional use of microcomputers; however this position became a coordination point for all microcomputers in the district.

In 1983 the Superintendent of Schools retired. The new superintendent established instructional use of the computer as a

district priority. In 1984 he hired an Assistant to the Superintendent for Technology (AST). The new position was given responsibility for both central data processing and microcomputers, the first time one individual was responsible for both. It also gave technology cabinet level representation.

One of the major job responsibilites of the AST was the development of both short and long-range plans for information and communications processing within the district. In summer and early fall of 1984 the AST, working with the supervisor of data processing and an ad hoc committee, developed a pilot plan for providing instructional and administrative computer support to the buildings. The plan involved the placement of microcomputers in three buildings. The microcomputers were to be supplemented with printers and optical scanners. The plan also called for the implementation of a commercially available instructional management system. The cost of the total system was estimated at $60,000. The pilot systems were to be evaluated. If the pilot was a success, the microcomputer systems were to be implemented districtwide over a two year period at an estimated cost of $650,000. The plan was presented to the Board of Education in October 1984. Inspite of the priority assigned to technology and the relatively modest cost of the pilot, it was not approved.

The response of the Board was interpreted not as a repudiation of the plan or the need to use technology, but as a statement of concern about the thought that went into the plan and the level of support for the plan and the cost/benefits of making a $650,000 expenditure to implement the system districtwide. This interpretation led to the

conclusion that the planning process was faulty and needed to be revised. What was needed was a process that involved a wider constituency and focused on the cost benefits of computer related expenditures.

A decision was made to take a different approach to the development of a district plan for technology. In August, 1984, while developing the initial plan, the AST had met with representatives of IBM Corporation. IBM has a history of assisting educational institutions in studies of institutional needs in the area of information and communications processing. The planning process they use is called Applications Technology Transfer (ATT).1

The contact with IBM was renewed in late 1984. The ATT methodology was reviewed and adopted. IBM offered to support the planning process by providing an ATT specialist to the district free of charge, if the top administrators in the district could reach consensus on the goals of the proposed ATT study.

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1 The title has recently been changed from Applications Technology Transfer (ATT) to Applications Transfer System (ATS) to avoid using an acronym associated with a competitor firm in the computer market.

In December, 1984, a one and one-half day workshop was held to identify district information and communiations processing problems and to establish goals for the study. Participants in the workshop were the Superintendent's cabinet and the Director of Evaluation. Four goals for a data processing/communications study were established. They were the:

(1) Identification of methods for improved collection, access, and delivery of information and communications in the district.

(2) Identification of training requirements and plans to meet them.

(3) Development of district policies regarding information and communications in the district.

(4) Development of long range plans for the implementation of technology to assist the district in its information and communication needs along with mechanisms to update the plan on a regular basis.2

Based on progress during the workshop with the executive group, a decision was made to complete the study. Plans were finalized in December, 1984. A schedule was developed and a study team appointed. The Assistant to the Superintendent for Technology was appointed chairman of the study team. The team included four other members of the Superintendent's cabinet, the Director of Evaluation, the Supervisor of Data Processing, an ATT study specialist from IBM, and two local representatives of the Lincoln IBM office. The procedures, findings and recommendations were presented in a final report entitled

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2 Information Communications Study, April 1985, page 1

Information/Communication Study, April, 1985. The remainder of this paper summarizes the procedures, findings, and recommendations of the study, outlines the major provisions of the data processing plan that evolved from the study, and discusses district progress in data processing since the study was completed.

Procedures

The ATT methodology is designed to focus institutional attention and resources on a specific problem area. The duration of the study is, by design, relatively short; most of the work in the Lincoln study was completed during a five week period. However, the study is intense: it involves the team members, key members of the district administration, on nearly a full-time basis for the entire period. The methodology is results oriented. The effort of the team is directed towards the accomplishment of the objectives established during the executive planning session. The IBM consultant acts both as an advisory to the study team and as a cataylst in keeping the team working towards the objectives of the study.

The study was conducted in discrete steps or stages. The first step was the executive goal setting workshop described in the previous section. The second step was the development of a plan for the study. The planning step included the orientation of the study team, development of questionnaires and interviews, selection of the sample, development of a data collection schedule, establishment of study milestones, and assignment of target dates for the milestones.

The selection of the sample was a particularly key step. The sample was designed to represent all parties that had a vested interest in data processing; teachers, building administrators, clerks, data processing staff, the purchasing department, the evaluation team, media specialists, aides, curriculum consultants, student services, counselors, etc.

The third step was data collection. Questionnaires were distributed to all the individuals included in the sample. The questionnaires focused on information utilization, problems encountered that are related to the utilization of information, and recommendations for improving data processing services and facilitating the use of information. After they had completed the questionnaires, the individuals in the sample were interviewed. The interviews were conducted in groups of from three to six participants. Job similarity was the basis for the groupings. The interviews were conducted by the study team. The interviews were quasi-structured. A predetermined set of questions were presented to each group. However, time was allotted for impromptu questions and responses. The study team was more concerned about understanding problems being encountered and recommendations made than with combining responses to make statistical inferences. The interviews included questions similar to those on the questionnaire. Each member of the study team had an opportunity to review the completed questionnaires submitted by the group prior to the interview session. Moreover, the group setting for the interviews provided the participants with the opportunity to react to the views and

opinions of other participants and provided the participants with a different perspective of their own responses. A total of 120 staff were interviewed in 28 work related groups.

The fourth step was data analysis. The analysis involved the summarization and classification of the information collected on the questionnaires and during the interviews. The focal point of analysis was current uses, problems, costs associated with the problem, future uses, recommendations, and the potential cost-benefits of the recommendation.

The fifth step involved preparation of the final report and preparation of a plan for the implementation of technology in the district. The entire study team was involved in the data collection and analysis of the results. However, the study team chair and the supervisor of data processing wrote the report and developed the district plan. The entire team was involved in the editing of the report.

Findings

The findings included lists of problem, recommendations and benefits associated with improved data processing. The initial list of problems, which included over 100 specific problems was eventually summarized into thirteen problem statements. The thirteen general problem statements are presented in Table 1.

TABLE 1

PROBLEMS ASSOCIATED WITH CURRENT
INFORMATION AND COMMUNICATION PROCESSING

1. No comprehensive district information/communication plan.
2. Student information is not accessible.
3. Student information that is available is not integrated.
4. Format for student information is not standardized across district.
5. No districtwide instructional management system.
6. Inadequate data and word processing capability.
7. Information and communication systems are inadequate.
8. Information cannot be obtained in a useable format.
9. Inadequate inservice and support in information management.
10. Inadequate inservice and support in the use of technology.
11. Inadequate inservice and support in use of current district data and word processing capabilities.
12. Up-to-date budget information is not available.
13. Financial information is not integrated into a common database.

Adapted from Information/Communications Study, Lincoln Public Schools, April, 1985, prepared by Tom Burnett, Assistant to the Superintendent for Technology.

A similar procedure was followed with recommendations. A comprehensive list of all recommendations was compiled. The recommendations were classified and combined into seven general recommendations. The recommendations are listed in Table 2.

Benefits identified with improved information and communication processing include more efficient/effective use of time, actual money savings, improved management, and improved communication with parents. The general description of benefits was further defined by specific examples of savings, i.e., (1) an estimated savings of 250 hours per counselor in monitoring student progress towards meeting graduation requirements, (2) the district experienced a $200,000 loss in State Aid because the information needed to qualify students was not accessible in 1981-82, (3) a savings of ten minutes clerical time per mobile student, which equals to a potential district-wide savings of approximately 500 hours of clerical time, etc. The major benefits are summarized in Table 3.

One of the most significant findings involved the projected growth in information use. The number of items of information on file in data processing had increased five-fold between 1970 and 1985. Based on the responses of teachers, principals and central office instruction staff, the number of instruction related items is expected to increase another five-fold between 1985 and 1990. The instructional information

TABLE 2

RECOMMENDATIONS MADE BY RESPONDENTS

1. Develop a comprehensive plan for developing, implementing, financing, or continuous updating of a standardized, integrated district information and communications system.

2. Provide and maintain an integrated district student and instructional management system.

3. Provide a district-wide computer-based electronic network that also can extend to external agencies.

4. Develop a flexible and user-friendly system for the retrieval and use of the information contained in the integrated district database.

5. Provide appropriate inservice for users and potential users of the district information system.

6. Provide technical support to the users of district information system.

7. Provide and maintain an integrated centralized district financial and accounting system.

Taken from Information/Communications Study, Lincoln Public Schools, April, 1985, prepared by Tom Burnett, Assistant to the Superintendent for Technology, Page v.

TABLE 3

SUMMARY OF RESPONSES TO BENEFITS STATEMENTS

1. More informed and threfore better decisions.
2. Better programs resulting from better information.
3. Improved public relations.
4. More reliable information.
5. Less reliance on printed documents.
6. Improved communication throughout the district.
7. Improved financial accountability.
8. More effective use of staff time.
9. More appropriate student placements.
10. Improved staff morale.

Adapted from Information/Communications Study, Lincoln Public Schools, April, 1985, prepared by Tom Burnett, Assistant to the Superintendent for Technology.

explosion is summarized in Figure 1. Based on these projections, and similar though less dramatic projections in other areas, (business, student services, personnel, etc.), the district needed to either take immediate steps to (1) make data processing more efficient and responsive, or (2) take drastic steps to restrict growth of, access to and expectations for information.

Data Processing Plan

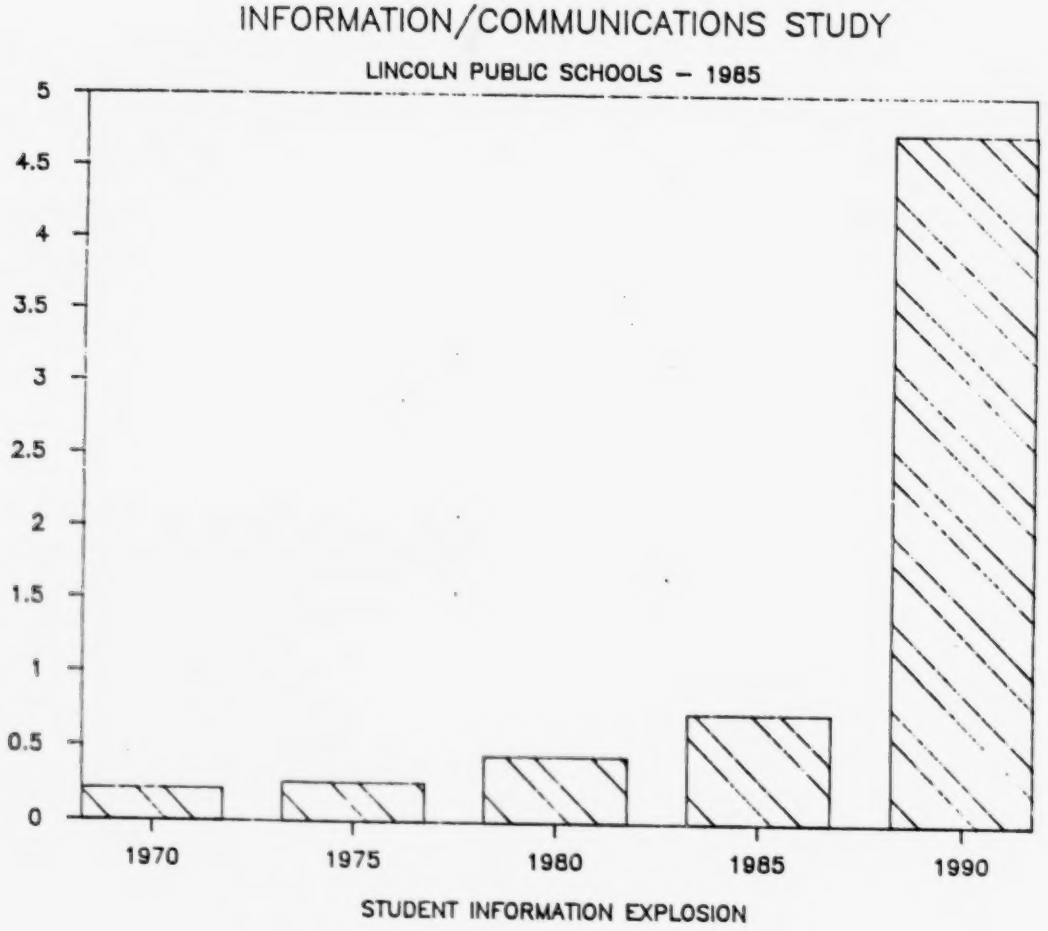
One of the four goals of the study was the development of a plan for the implementation of technology in the district. From the vantage point of the Assistant to the Superintendent for Technology, this was the primary goal. The plan that evolved included the installation of multi-terminal mini-computer systems in each school, linking all the mini-computer systems together through the district's 4341 mainframe, and redirecting software development in the district. The plan was organized into five phases. The major objectives and projected costs of each phase are listed in Table 4. The projected timeline for the phases are presented in Figure 2.

Progress to Date

In April, 1985, the plan was presented to the Lincoln Public School's Board of Education and approved. In May, 1985, the board established a non-profit corporation for the purpose of issuing bonds to fund the plan. Bonds were issued and sold generating approximately $1,063,000 for the plan.

FIGURE 1

NUMBER OF ITEMS PER SYSTEM (Thousands)



Taken from Information/Communications Study, Lincoln Public Schools, April, 1985, prepared by Tom Burnett, Assistant to the Superintendent for Technology, Page 8.

TABLE 4

THE MAJOR OBJECTIVES AND PROJECTED COSTS FOR THE FIVE YEAR PHASES OF THE IMPLEMENTATION PLAN

PHASE 1:

The installation and testing of the multi-user computer system which is planned for each secondary school.

Projected Cost: $40,000 Projected Completion Date: June, 1985

PHASE 2:

The evaluation of a district-wide word processing system and installation of electronic mail and document distribution software to be used in the district-wide electronic network.

Projected Cost: $4,000 Projected Completion Date: September, 1985

PHASE 3:

Installation of a multi-terminal computer system in each senior high school, installation of software to meet high school needs, organization and staffing of a district Information Center responsible for providing user training and support, and implement district-wide word processing support.

Projected Cost: $220,000 Projected Completion Date: January, 1986

PHASE 4:

Installation of a multi-terminal mini-computer system in each junior high school, installation of software to address junior high school needs, and provision of training and support to junior high users.

Projected Cost: $320,000 Projected Completion Date: June, 1986

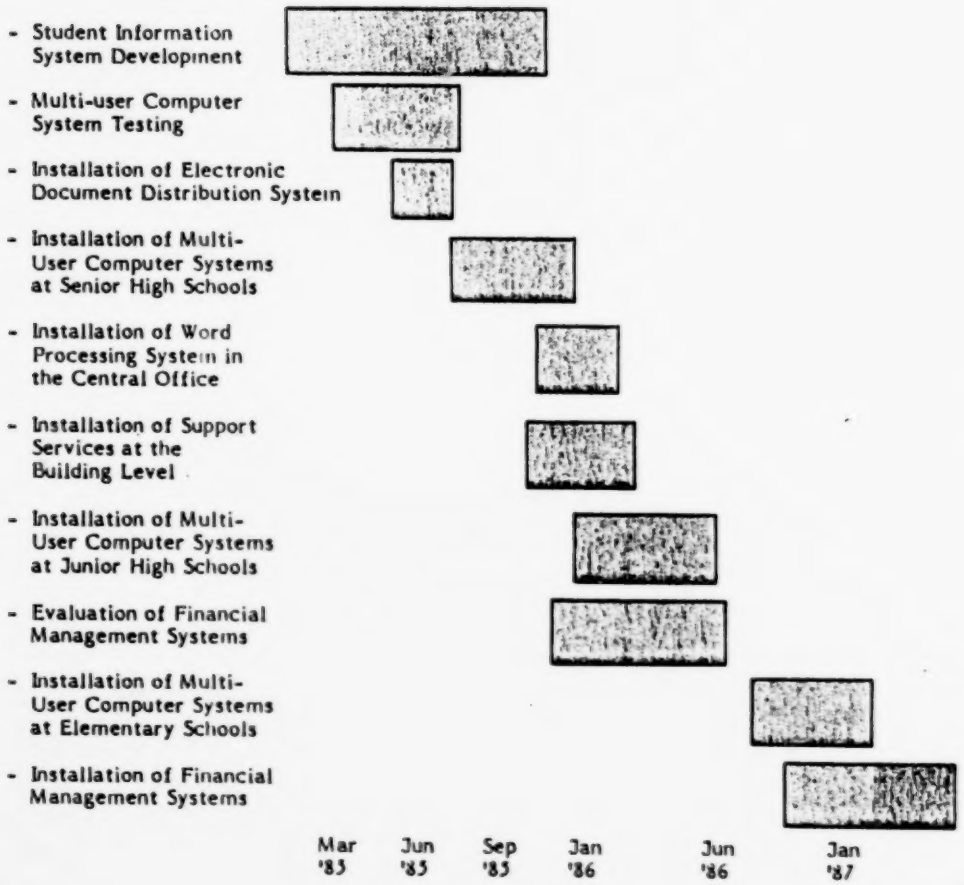
PHASE 5:

Installation of a multi-terminal mini-computer system in each elementary school, installation of software to address elementary school needs, and provision of training and support to elementary users.

Projected Cost: $480,000 Projected Completion Date: January, 1987

FIGURE 2

TIMELINE FOR KEY MILESTONES IN THE DISTRICT TECHNOLOGY PLAN


- Student Information System Development
- Multi-user Computer System Testing
- Installation of Electronic Document Distribution System
- Installation of Multi-User Computer Systems at Senior High Schools
- Installation of Word Processing System in the Central Office
- Installation of Support Services at the Building Level
- Installation of Multi-User Computer Systems at Junior High Schools
- Evaluation of Financial Management Systems
- Installation of Multi-User Computer Systems at Elementary Schools
- Installation of Financial Management Systems
Mar '85
Jun '85
Sep '85
Jan '86
Jun '86
Jan '87

Taken from Information/Communications Study, Lincoln Public Schools, April, 1985, prepared by Tom Burnett, Assistant to the Superintendent for Technology, Page 42.

In July, 1985, the first mini-computing system was installed in the district data processing center. In addition, an information center was established for the purpose of user training and support. Testing of the system was done at this time. In August, this system was placed in one senior high school to test the computing system and software. This field test led to several changes.

First, more data was needed and additional programs had to be written to meet expanding user needs. This led to the upgrading of future systems in terms of disk storage and memory. Second, training was restructured to more closely meet the expectations of building staff. Third, a different wiring scheme was used in subsequent installations to allow the flexibilty needed by system users.

While the field test was being conducted a third mini-computer was installed in the district's administration building. This system was designed to be the hub of a district-wide word processing plan.

In October, 1985, a study was completed by members of the district evaluation team. This evaluation results indicated that:

1. The computing systems were fast and easy to use.
2. The software applications were adequate and increased efficiency.
3. The training and support provided was effective and necessary.
4. The major benefit of the systems was increased efficiency.
5. A few applications were still being done in the traditional way as well as being done electronically via computer.

This evaluation led staff to conclude that the test was successful and expansion of the systems to additional schools was appropriate.

In November, 1985, information processing systems were installed in the remaining three senior high schools and one junior high school. Following a successful implementation in these schools, systems were installed in the remaining eight junior high schools in March, 1986.

In April, 1986, systems were installed in three elementary schools for testing. If these tests prove successful, additional systems will be installed in each elementary school before September, 1986.

In addition to the installation of information systems and applications software in the buildings, the data processing staff have been involved in upgrading the central information systems for business

affairs, personnel, and instruction to more efficiently support building level information processing. These upgrades along with the plans for a new business system have led the data processing center to seek additional personnel resources.

Conclusions

The study provided an integrated framework for information use within the district and provided data processing with the sense of direction and support that had been lacking prior to the study. Establishing a sense of direction and eliciting support for data processing were the unwritten reasons for and represent the two major accomplishments of the study. Evidence of the accomplishments is available from a number of sources.

1. First and foremost the data processing plan (the Information/Communications Plan) was approved and funded by the Board of Education less than six months after a similar and substantially less expensive plan had been rejected.

2. Since the plan was approved the district has had a change in Superintendents and, although technology was a pet project of the old superintendent, the new administration has continued to support and fund technology.

3. The district began implementing the plan in May 1985 and has already completed Phase 4 of five hardware implementation phases. Substantial progress has also been made toward implementing Phase 5. Mini-computers have been installed and an Information Center established.

4. In a recent report, the AST indicated that identified information needs of the district are being met; information system users have accepted responsibility for operating, managing and using the information systems in their buildings; information system users are excited about their ability to do their jobs more accurately and efficiently; and information users are excited about their ability to get the information they need in a timely, efficient manner.

5. A pilot implementation of the mini-computer in a high school setting was formally evaluated and judged to be a success. Some resistance to the computer was identified however less than might be expected. Given the general level of support, the resistors are more in jeopardy than the programs. The evaluation also uncovered some other problems, specifically duplication of effort and training problems. However these problems have already been addressed and hopefully resolved.

6. Finally, the results of the initial study were validated by a follow-up survey conducted in April, 1985. Thirty staff were included in the survey; this represents one fourth of the

original study sample. The results of the survey indicated unanimous agreement both about the importance of the study to the district and with the general provisions of the plan. There was near unanimous agreement with the problems identified in the study and with the recommendations for solving those problems. There was less agreement that the plan was feasible. However more than 80% of the respondents indicated that the plan was feasible.

The current challenge is the redesign of the student information system and the development of applications to support the schools. The question of whether or not we have the resources and/or the insights to fully develop all the data bases and applications we have promised remains. IBM has continued to support the district with both software and staff. This support is much appreciated. However, regardless of what happens in the future, the current plans for use of technology in the district are better than any earlier plan and support for data processing in the district has been solidified. The district is in a better position to move forward in data processing than at any time in the past.